

EXHIBIT 4



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 09/850,124

Filing Date: May 7, 2001

Applicant: Krishna BALACHANDRAN et al.

Group Art Unit: 2634

Examiner: Eva Y. Zheng

Title: ENHANCED FREQUENCY HOPPING IN A WIRELESS
SYSTEM

Attorney Docket: 29250-000873/US

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April 5, 2005

REQUEST FOR RECONSIDERATION

Sir:

Applicants are in receipt of the Final Office Action dated January 7, 2005 ("Final Office Action"), and respond as follows.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 11 of this paper.

IN THE CLAIMS

Kindly amend claims 1, 3, 5, 8, 9, 10, 13, 14, 15, 17, 19, 21, 22, 24 and 26 as follows.

The following is a complete listing of revised claims with a status identifier in parenthesis.

LISTING OF CLAIMS

1. (Currently Amended) A method for use in wireless equipment, the method comprising the steps of:

transmitting signals using frequency hopping over a time period T , by pseudorandomly selecting a frequency from a set of N frequencies such that over at least a portion of the time period T , the frequency selection is constrained to less than the N frequencies and such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T [.],

where N is the total number of frequencies available for frequency hopping.

2. (Cancelled)

3. (Currently Amended) A method of frequency hopping for use in wireless equipment, the method comprising the steps of:

storing a set of hopping frequencies; and pseudorandomly selecting frequencies from the set of hopping frequencies over a time period T by limiting the available frequencies from the

hopping set over at least a portion of the time period T such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T .

4. (Cancelled)

5. (Currently Amended) A method of frequency hopping for use in wireless equipment, the method comprising the steps of:

initializing a hopping set to a size of F frequencies, the hopping set used to pseudorandomly select therefrom hopping frequencies over a time period T ; and

reducing the size of the hopping set over a portion of the time period T by at least one frequency such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T [1.],

where F is the number of frequencies in a hopping state, H , over which a wireless endpoint is constrained to hop.

6. (Currently Amended) A method of frequency hopping for use in wireless equipment, the method comprising the steps of:

initializing a hopping set to a size of N frequencies, the hopping set used to select therefrom hopping frequencies over a time period T ; and

pseudorandomly selecting frequencies from the hopping set over the time period T such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T [[.]],

where N is the total number of frequencies available for frequency hopping.

7. (Cancelled)

8. (Currently Amended) A method of frequency hopping for use in wireless equipment, where a hopping set is initialized to a size of N frequencies, the hopping set used to select therefrom hopping frequencies over a time period T , the method comprising the steps of:

determining a hopping index value;

modifying the hopping index value by at least the modulo of a number F ,
where $F \leq N$;

pseudorandomly selecting a hopping frequency from the hopping set of a function of the modified hopping index value;

adjusting the order of the hopping set such that the selected hopping frequency is now at a position corresponding to the value of F and such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T ;

reducing the value of F ; and

returning to the determining step[[.]],

where N is the total number of frequencies available for frequency hopping and where F is the number of frequencies in a hopping state, H , over which a wireless endpoint is constrained to hop.

9. (Currently Amended) The method of claim 8 wherein when the value of F reaches a predefined minimum value, further including the step of shifting the hopping set in a cyclical direction by a value equal to a difference between a predefined maximum value for F and the minimum value, modulo N .

10. (Currently Amended) A method for frequency hopping for use in wireless equipment, the method comprising the steps of:

initializing a hopping set to a size of N frequencies, the hopping set used to select therefrom hopping frequencies over a time period T ;

dividing the hopping set into an allowable frequency set and a prohibited frequency set;

pseudorandomly selecting frequencies from the allowable frequency set;
and

after at least one frequency selection, adjusting the membership in the allowable frequency set and the prohibited frequency set such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T [.],

where N is the total number of frequencies available for frequency hopping.

11. (Cancelled)

12. (Original) The method of claim 10 wherein membership in the allowable frequency set and the prohibited frequency set at a current time is derived from knowledge of the allowable frequency set and the prohibited frequency set at an earlier time.

13. (Currently Amended) The method of claim 10 wherein knowledge of the allowable frequency set and the prohibited frequency set at a particular time is provided by one wireless endpoint to ~~the other~~ another wireless endpoint through explicit signaling.

14. (Original) The method of claim 10 wherein all N frequencies in the hopping set are assumed allowable at pre-determined time instants.

15. (Currently Amended) A pseudorandom frequency hopping method for use in wireless equipment, the method comprising the steps of:

dividing a hopping set into an allowable frequency set and a prohibited frequency set; and

transmitting information associated with the division of the hopping set to another wireless endpoint such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period

T .

16. (Original) The method of claim 15 wherein the transmitted information enables the other wireless endpoint to derive the allowable frequency set.

17. (Currently Amended) A wireless endpoint comprising:
a transmitter for transmitting signals using frequency hopping over a time period T ; and

a processor for pseudorandomly selecting a frequency from a set of N frequencies such that over at least a portion of the time period T , the frequency selection is constrained to less than the N frequencies and such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T [.],

where N is the total number of frequencies available for frequency hopping.

18. (Cancelled)

19. (Currently Amended) A wireless endpoint comprising:
a memory for storing a set of hopping frequencies; and
a processor for pseudorandomly selecting frequencies from the set of hopping frequencies over a time period T by limiting the available frequencies from the hopping set over at least a portion of the time period T such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T .

20. (Cancelled)

21. (Currently Amended) A wireless endpoint comprising:

a memory for storing a hopping set comprising F frequencies, the hopping set used to pseudorandomly select therefrom hopping frequencies over a time period T ; and

a processor for reducing the size of the hopping set over a portion of the time period T by at least one frequency such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T [.],

where F is the number of frequencies in a hopping state, H , over which a wireless endpoint is constrained to hop.

22. (Currently Amended) A wireless endpoint comprising:

a memory for storing a hopping set comprising N frequencies, the hopping set used to select therefrom hopping frequencies over a time period T ; and

a processor for pseudorandomly selecting frequencies from the hopping set over a time period T such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T [.]

where N is the total number of frequencies available for frequency hopping.

23. (Cancelled)

24. (Currently Amended) A wireless endpoint comprising:

a memory for storing a hopping set comprising N frequencies, the hopping set used to pseudorandomly select therefrom hopping frequencies over a time period T ; and

a processor for (a) determining a hopping index value, (b) modifying the hopping index value by at least the modulo of a number F where $F \leq N$, (c) selecting a hopping frequency from the hopping set as a function of the modified hopping index value, (d) adjusting the order of the hopping set such that the selected hopping frequency is now at a position corresponding to the value of F such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T , (e) reducing the value of F ; and (f) returning to (a) [.]

where N is the total number of frequencies available for frequency hopping and where F is the number of frequencies in a hopping state, H , over which a wireless endpoint is constrained to hop.

25. (Original) The wireless endpoint of claim 24 wherein when the value of F reaches a predefined minimum value, the processor further shifts the hopping set in a cyclical direction by a value equal to a difference between a predefined maximum value for F and the minimum value, modulo N .

26. (Currently Amended) A wireless endpoint comprising:

a memory for storing a hopping set comprising N frequencies, the hopping set used to select therefrom hopping frequencies over a time period T ; and

a processor for (a) dividing the hopping set into an allowable frequency set and a prohibited frequency set, (b) pseudorandomly selecting frequencies from the allowable frequency set, and (c) after at least one frequency selection, adjusting the membership in the allowable frequency set and the prohibited frequency set such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of the time period T [.],

where N is the total number of frequencies available for frequency hopping.

27. (Cancelled)

REMARKS**Claim Amendments**

Claims 1, 3, 5, 8, 10, 15, 17, 19, 21, 24 and 26 have been amended to include a feature contained in claim 6 (and 22). As such, Applicants respectfully submit that these amendments do not require an additional search by the Examiner. Rather, these amendments place the claims in condition for allowance.

Claims 9 and 13 have been revised to correct for grammatical errors. These revisions are not related to the patentability of these, or other, claims.

The claims are patentable over the newly cited references to Munday et al. ("Mundy") and Haartsen ("Haartsen")

Each of the claims of the present invention includes the feature of pseudorandomly selecting a frequency or frequencies from a set of frequencies that has been constrained, reduced or limited "such that at least one of the selected frequencies is prohibited from subsequent selection in at least a portion of [a] time period, T ."

It is respectfully submitted that neither Munday nor Haartsen, taken separately or in combination, discloses or suggests such a prohibition on frequency selection.

Instead, it appears that after a set of frequencies is selected in Munday or Haartsen any frequency within the set can be re-selected without prohibition. Said another way, neither Munday nor Haartsen is prohibited

from re-selecting a frequency, from a set of allowable frequencies, that has already been selected during a time period, T , as in the claims of the present invention.

Therefore, Applicants respectfully submit that neither Munday nor Haartsen can anticipate or render obvious the claims of the present invention.

Applicants respectfully request entry of the amendments referred to above, withdrawal of the pending rejections and allowance of claims 1, 3, 5, 6, 8-10, 12-17, 19, 21, 22 and 24-26.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John E. Curtin at the telephone number of the undersigned below.

In the event this Response does not place the present application in condition for allowance, applicant requests the Examiner to contact the undersigned at (703) 668-8000 to schedule a personal interview.

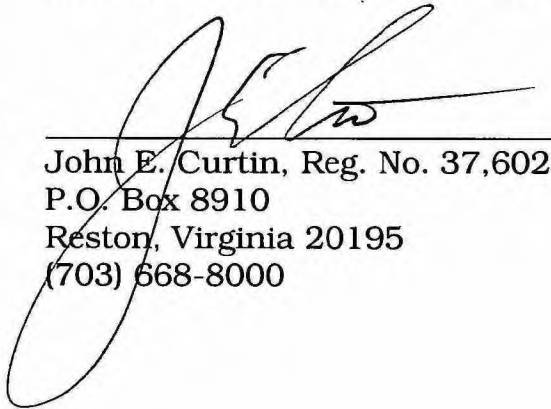
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If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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By



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